7-04 STORM SEWERS

7-04.1 Description

This Work consists of constructing storm sewer lines in accordance with the Plans, these Specifications, and the Standard Plans, as staked.

7-04.2 Materials

Materials shall meet the requirements of the following sections:

Plain Concrete Storm Sewer Pipe	9-05.7(1)
Reinforced Concrete Storm Sewer Pipe	9-05.7(2)
Steel Spiral Rib Storm Sewer Pipe	9-05.9
Steel Storm Sewer Pipe	9-05.10
Aluminum Storm Sewer Pipe	9-05.11
Solid Wall PVC Storm Sewer Pipe	9-05.12(1)
Profile Wall PVC Storm Sewer Pipe	9-05.12(2)
Aluminum Spiral Rib Storm Sewer Pipe	9-05.17
Corrugated Polyethylene Storm Sewer Pipe	9-05.20

Where steel or aluminum are referred to in this Section in regard to a kind of storm sewer pipe, it shall be understood that steel is zinc coated (galvanized) or aluminum coated (aluminized) corrugated iron or steel and aluminum is corrugated aluminum alloy as specified in Sections 9-05.4 and 9-05.5.

Thermoplastic storm sewer pipe includes solid wall PVC storm sewer pipe, profile wall PVC storm sewer pipe, and corrugated polyethylene storm sewer pipe.

Measurement for payment of the Bid items associated with the storm sewer installation will be based on the diameter of the storm sewer pipe described by the Bid item in the Plans.

It is not necessary that all storm sewer pipe on any one project be of the same kind of material. However, all contiguous pipe shall be of the same size, material, thickness, class, and treatment and shall be that required for the maximum height of cover.

When schedule A or B storm sewer pipe is specified in the Plans, the Contractor shall provide the specified schedule and diameter but has the option of furnishing any of the acceptable materials shown in the Storm Sewer Pipe Schedules Table.

Storm Sewer Pipe Schedules

Schedules (Fill Ht.)	Dia. (In.)	Concrete	PVC[1]	PE[2]	Steel[3] 2⅔" x ½" or Spiral Rib	Aluminum 2⅔" x ½" Corr. • Tr. 5 • Plain With Gasketed Seams	Aluminum Spiral Rib • Tr. 5 • Plain With Gasketed Seams
A 2′ − 15′	12	Plain or Cl. IV	SW or PW	Allowed	0.064" (16 Ga.)	0.060" (16 Ga.)	0.060" (16 Ga.)
	18	Plain or Cl. IV	SW or PW	Allowed	0.064" (16 Ga.)	0.060" (16 Ga.)	0.060" (16 Ga.)
	24	Plain or Cl. IV	SW or PW	Allowed	0.064" (16 Ga.)	0.060" (16 Ga.)	0.060" (16 Ga.)
	30	Class III	PW	Allowed	0.064" (16 Ga.)	0.075" (14 Ga.)	0.060" (16 Ga.)
	36	Class III	PW	Allowed	0.064" (16 Ga.)	0.075" (14 Ga.)	0.060" (16 Ga.)
	42	Class III	PW	Allowed	0.064" (16 Ga.)	0.105" (12 Ga.)	0.075" (14 Ga.)
	48	Class III	PW	Allowed	0.064" (16 Ga.)	0.105" (12 Ga.)	0.075" (14 Ga.)
B 15′ − 25′	12	Class V	SW or PW		0.064" (16 Ga.)	0.060" (16 Ga.)	0.060" (16 Ga.)
	18	Class V	SW or PW		0.064" (16 Ga.)	0.060" (16 Ga.)	0.060" (16 Ga.)
	24	Class V	SW or PW		0.064" (16 Ga.)	0.060" (16 Ga.)	0.060" (16 Ga.)
	30	Class V	PW		0.064" (16 Ga.)	0.075" (14 Ga.)	0.075" (14 Ga.)
	36	Class V	PW		0.064" (16 Ga.)	0.075" (14 Ga.)	0.105" (12 Ga.)
	42	Class V	PW		0.064" (16 Ga.)	0.105" (12 Ga.)	0.105" (12 Ga.)
	48	Class V	PW		0.064" (16 Ga.)	0.105" (12 Ga.)	0.105" (12 Ga.)

1. PVC = Polyvinyl Chloride Pipe, SW = Solid Wall PVC, PW = Profile Wall PVC
2. PE = Corrugated Polyethylene Pipe
3. Steel pipe options for either 2⅔" x ½" corrugations or spiral rib include: Tr. 5 galvanized, Tr. 2 galvanized with gasketed seams, Tr. 5 aluminized, or plain aluminized with gasketed seams.

7-04.3 Construction Requirements

Storm sewers shall be constructed in accordance with Section 7-08.3.

7-04.3(1) Cleaning and Testing

7-04.3(1)A General

The requirements of Section 7-17.3(2)A shall apply to storm sewers.

7-04.3(1)B Exfiltration Test — Storm Sewers

Prior to making exfiltration leakage tests, the Contractor may fill the pipe with clear water to permit normal absorption into the pipe walls.

Leakage shall be no more than 1-gallon per hour per inch of diameter per 100-feet of storm sewer pipe, with a minimum test pressure of 6-feet of water column above the crown at the upper end of the pipe or above the active ground water table, whichever is higher as determined by the Engineer. The length of pipe tested shall be limited so that the pressure on the invert of the lower end of the Section tested shall not exceed 16-feet of water column. For each increase in pressure of 2-feet above a basic 6-feet measured above the crown at the lower end of the test section, the allowable leakage shall be increased by 10-percent.

7-04.3(1)C Infiltration Test — Storm Sewers

Whenever the ground water table is above the crown of the higher end of the pipe section at the time of testing, an infiltration test may be performed in lieu of the exfiltration test upon written permission of the Engineer. The maximum allowable limit for infiltration shall be 0.8-gallon per hour per inch of diameter per 100-feet of length with no allowance for external hydrostatic head.

7-04.3(1)D Other Test Allowances — Storm Sewers

Other allowances for infiltration and exfiltration tests shall be in accordance with Section 7-17.3(2)D.

7-04.3(1)E Low Pressure Air Test for Storm Sewers Constructed of Air-Permeable Materials

When air-permeable pipe is subjected to a low-pressure air test, all of the provisions of Section 7-17.3(2)E shall apply, except that the time in seconds for the pressure drop shall be equal to or greater than the required time as shown in the table below:

Pipe Dia. (in)	Time in Seconds for Pressure Drop Pipe Length (ft)									
	50	100	150	200	250	300	350	400	450	500
4	5	9	14	18	22	27	31	36	40	45
6	10	20	30	40	50	60	70	80	85	85
8	18	36	54	71	89	107	114	114	114	114
10	28	56	84	111	139	142	142	142	143	159
12	40	80	120	160	170	170	170	183	206	228
15	63	125	188	213	213	214	250	286	320	360
18	90	180	255	255	257	310	360	410	460	520
21	123	245	298	298	350	420	490	560	630	700
24	160	320	340	370	460	550	640	730	830	920
27	203	390	390	460	580	700	810	930	1040	1160
30	250	430	430	570	720	860	1000	1140	1290	1430

All time values listed in the table are in seconds. If a section to be tested includes more than 1 pipe size, the total time required can be found by adding the time values for each size of pipe and its corresponding length. Interpolate between valves for pipe lengths not shown.

Pipe over 30-inches in diameter shall be tested 1 joint at a time in accordance with ASTM C 1103.

7-04.3(1)F Low Pressure Air Test for Storm Sewers Constructed of Non Air Permeable Materials

When non air-permeable pipe is subjected to a low-pressure air test, all of the provisions of Section 7-17.3(2)E shall apply, except that the time in seconds for the pressure drop shall be equal to or greater than 4 times the time shown in the table listed in Section 7-04.3(1)E.

Pipe over 30-inches in diameter shall be tested 1 joint at a time in accordance with ASTM C 1103.

Reaches of thermoplastic pipe containing no joints shall be exempt from testing requirements.

7-04.4 Measurement

The length of storm sewer pipe will be the number of linear feet of completed installation measured along the invert and will include the length through elbows, tees, and fittings. The number of linear feet will be measured from the center of manhole to center of manhole or to the inside face of catch basins and similar type Structures.

The length of testing storm sewer pipe in conformance with Section 7-17.3(2)A will be the number of linear feet of completed installation actually tested.

7-04.5 Payment

Payment will be made in accordance with Section 1-04.1, for each of the following Bid items that are included in the Proposal:

"Plain Conc. Storm Sewer Pipe ____ In. Diam.", per linear foot.

"Class ____ Reinf. Conc. Storm Sewer Pipe ____ In. Diam.", per linear foot.

"Tr. ____ St. Storm Sewer Pipe ____ In. Th. ____ In. Diam.", per linear foot.

"Tr. ____ Al. Storm Sewer Pipe ____ In. Th. ____ In. Diam.", per linear foot.

"Solid Wall PVC Storm Sewer Pipe ____ In. Diam.", per linear foot.

"Profile Wall PVC Storm Sewer Pipe ____ In. Diam.", per linear foot.

"Corrugated Polyethylene Storm Sewer Pipe ____ In. Diam.", per linear foot.

"Schedule ____ Storm Sewer Pipe ____ In. Diam.", per linear foot.

The unit Contract price per linear foot for storm sewer pipe of the kind and size specified shall be full pay for all Work to complete the installation, including adjustment of inverts to manholes.

"Testing Storm Sewer Pipe", per linear foot.